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A NEW METHOD FOR TESTING ADVERTISING EFFECTIVENESS THROUGH EYE MOVEMENT PHOTOGRAPHY

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A NEW METHOD FOR TESTING ADVERTISING EFFECTIVENESS THROUGH EYE MOVEMENT PHOTOGRAPHY[1]

JOHN JOSEPH MCNAMARA

I. INTRODUCTION

The enormous sums of money spent on advertising in space media justify the use of scientific techniques for evaluating copy. Starch, commenting on this, states:

> The important practical problem is, Are there any methods by which we may eliminate the weak advertisements and substitute stronger ones in their places before any considerable amount of money is expended for space? The importance of this problem is further emphasized when we realize that in large national advertising campaigns the same identical advertisement is commonly inserted in a considerable number of mediums. . . .
>
> An advertisement to be successful,
> (1) Must be seen
> (2) Must be read
> (3) Must be believed
> (4) Must be remembered
> (5) Must be acted upon[2]

These five qualities, which were originally outlined by Starch as the factors an advertisement should possess, are rather generally accepted. Many men in the advertising profession will claim that the only important element is action value and that the testing of other elements is unnecessary. However, an advertisement could hardly have action value without first having attention value, i.e., without first having been seen and read. Hence, it is of prime importance to test attention value.

Walter Dill Scott was one of the pioneers in the study of advertisements. His efforts date back to the beginning of the century. Since

[1] This article is a dissertation submitted to the Faculty of Purdue University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy, June, 1941.

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Recommended for publication by Dr. Joseph Tiffin, August 1, 1941. Summary of Studies of Position throughout the Magazine.

[2] Daniel Starch, *Principles of Advertising*. Chicago: A. W. Shaw Co., 1923, pp. 308-09.

that time there have been two groups interested in the study of advertising: people engaged in the advertising profession and psychologists or teachers of advertising. Study on the part of both groups has followed two chief trends: first, the evaluation of specific advertisements, and, second, the analyzing of advertisements for the purpose of formulating general laws relative to size, color, position on the spread, position throughout the magazine, appeals, and many other factors too numerous to mention.

In general, there has been little uniformity in the techniques used. There have also been appreciable differences in the results obtained. These differences in results have been due largely to the fact that each experimenter has usually tested but one or a few aspects of the effectiveness of an advertisement; either attention, interest, conviction, memory, or action has been stressed. Different experimenters dealing with different phases can scarcely be expected to obtain similar results. The divergent results can best be seen from the following tables. Table I gives the experimenter, the date of the experiment, the technique, and the results of a considerable number of the important studies of position on the spread. Table II gives similar data for studies of position throughout the magazine.[3]

Some of the criticisms of techniques used in the past are probably best expressed by Link, Poffenberger, Lucas, and Gaudet and Zients.

Link, in a general criticism of the laboratory technique, states:

> In general, one of the fundamental weaknesses of the laboratory experiments has been the fact that usually the advertisements tested were tested under artificial conditions or with subjects who did not necessarily represent the market for which the advertisements were intended.[4]

Poffenberger offers a criticism on studies of size which is equally applicable to studies of other factors. He states:

> One can take specimens of advertising as one finds them, pick a considerable number of full page, half page, quarter page, and so forth, more or less at random, and measure the relative attention value of these size groups. The assumption underlying this method

[3] A more complete review of the various techniques used in studying advertising, with special emphasis on the experiments listed in the following tables, is given in Appendix A of the thesis by the writer which is on file in the library of Purdue University.

[4] H. C. Link, *The New Psychology of Selling and Advertising*. New York: Macmillan Co., 1932, p. 104.

TABLE I.

Summary of Studies of Position on the Spread

Experimenter	Date	Technique	Results
Gale	1900	Tachistoscopic	In vertical division of page, left half was better than right half. In horizontal division into quarters, rank was U.R., L.L., U.L., L.R.
Adams	1915	Tachistoscopic	Upper left half of page and the left half of page had higher attention value.
Hotchkiss and Franken	1920	Recognition	No significant difference existed between right and left-hand pages. Percentages favored right-hand page by 5%.
Kitson	1923	Historical	Right-hand page used more than left in both magazines.
Starch	1923	Tachistoscopic	Upper half better than lower half. Rank for quarters was U.R., U.L., L.R., L.L.
Nixon	1924	Eye Fixation	Left-hand page superior to right-hand.
Strong	1925	Recall	No significant difference existed between right-hand and left-hand pages or between outside and inside columns.
Dulsky	1933	Eye Fixation	No significant difference existed between right-hand and left-hand pages.
Lucas	1937	Recognition	Right and left-hand pages were of equal value for full pages. Right-hand position was advantageous for smaller areas.

is that since the groups were selected for size differences only, all the other factors such as quality, form of layout, and so on, will vary indiscriminately throughout the groups, and, as attention factors, will offset each other. The difference in attention value of the size groups would then be attributed to the size factor. It cannot be safely granted, however, that all factors except size will vary at random. There are certain characteristics which may well go regularly with one size and not with another.[5]

[5] A. T. Poffenberger, *Psychology in Advertising*. Chicago: A. W. Shaw Co., 1925, p. 175.

TABLE II.

Summary of Studies of Position Throughout the Magazine

Experimenter	Date	Technique	Results
Starch	1914	Recall	Fourth cover had more than twice (209.9%) value of ordinary position. Second and third covers had approximately 50% greater value than ordinary position. Pages facing the second and third covers had 40% and 16% greater value, respectively, than ordinary position.
Ferguson	1934	Recognition	Each page in magazine seemed to have equal attention value for men and women. Positions less preferred were inside front-cover, page opposite first feature, and page opposite Post Scripts.
Lucas	1937	Recognition	Advertisements in fixed locations had a small general advantage over r.o.p. advertisements.

This same criticism has been offered against studies of position on the spread, position throughout the magazine, color, et cetera. Instead of eliminating the influence of intrinsic content by this method of "complimentary effects," a large variety of test material merely reduces that element.

Lucas offers the following criticism of earlier recognition experiments:

> No allowance was made for confusion of test advertisements with similar copy used in the same campaign or elsewhere. This criticism seems to apply to all attempts to measure the effects of single advertisements of products which have been advertised previously. Unless the respondent is required to distinguish the test advertisement from others in the same general campaign, it is impossible to rule out the cumulative effects of similar copy.[6]

[6] D. B. Lucas, "The Impression Values of Fixed Advertising Locations in the Saturday Evening Post," *Journal of Applied Psychology*, XXI, (December, 1937), 614.

The results found by Gaudet and Zients in a study begun by Kitson furnish a good illustration of one of the weaknesses of the historical technique. They state:

> These charts show that the proportion of full page advertisements increased almost seven-fold during the decade 1910-1920. During the period 1921-1923 there was a decline. In 1924 there was a rise which continued until 1926, when there was a sharp drop. Since then the curve shows a tendency to rise.[7]

This indicates that advertising is a rapidly changing field and often changing in no particular direction. The question arises as to whether the results of the past can be used to predict much about the future. The underlying fundamental assumption, that of the survival of the fittest, may also be questioned. Unless advertisers have been able to identify success with the particular factor investigated, the change may have been due to chance or due to some other factor not investigated.

One of the more recent techniques is that of eye-movement photography. In this, through the use of an eye-movement camera, an objective photographic record of the time spent by a reader on each part of each advertisement is furnished.

In the more recent developments, such as that of Karslake,[8] this technique permits the reading material to be placed at normal reading distance, giving the reader an unrestricted field of view.

The reading situation is a normal one, with the reader at leisure to leaf freely through the material to be read. The photographic record is easily interpreted, and sufficiently accurate for differentiation between adjacent areas of an advertisement.

Mean or median time spent on an advertisement by a group of readers is usually taken as the index of the worth of an advertisement. An analysis of Karslake's data discloses that this index is not entirely satisfactory. With some advertisements, an undue amount of time might be spent on an illustration with little or no time spent on other

[7] F. G. Gaudet and B. S. Zients, "History of Full Page Advertisements," *Journal of Applied Psychology*, XVI, (October, 1932), 513.

[8] James Spier Karslake, "The Purdue Eye-Camera: A Practical Apparatus for Studying the Attention Value of Advertisements," *Journal of Applied Psychology*, XXIV, (August, 1940), 417-40.

material. In other words, it seems probable that many readers might leave the page without knowing what product was being advertised or who the advertiser was, and yet this advertisement might be given a high rating if the mean or median time spent on the advertisement was used as the only index.[9]

A method utilizing eye-movement photography for the purpose of correcting certain errors made in previous experimentation seems desirable. Starch's point, that an advertisement must be seen, might be enlarged upon to read that an advertisement must not only be seen but that the product or the name of the advertiser must also be seen.

Eye-movement photography, besides offering an objective method for the evaluation of advertising copy, also seems to afford a technique for restudying or reformulating general laws in advertising, particularly those definitely pertaining to the attention-holding power of advertisements. Studies of position on the spread, position throughout the magazine, or of the distractive effect of cartoons would seem to come within the scope and limitations of this technique. A study of problems, such as these, by eye-movement photography, therefore, seemed desirable.

II. THE PROBLEM

In view of the need for a technique to evaluate advertisements by eye-movement photography which would take cognizance of whether or not the reader identified the advertiser, the problem of this investigation became the development of such a technique and the study of certain unanswered and new problems in advertising which lent themselves to investigation by this technique. Specifically, the problem was fivefold:

1. To develop a technique for evaluating the attention-holding power of advertisements. This method must be objective, and it must yield a meaningful and easily interpreted evaluation of the advertisement in terms of the probability that a person leafing through a magazine in a normal reading situation will look at some part of the advertisement long enough to identify the advertiser.

[9] This was brought out when marked discrepancies were noted on a few advertisements between ratings given by eye-movement photography and ratings of the same advertisements by a nationally known advertising agency.

2. To determine the reliability of the technique in terms of the groups studied and to make a comparison of male-female and student-non-student populations as to the way they differ in looking at advertisements.

3. To determine the relative attention-holding power of various locations in the magazine, such as inside front cover, page opposite first story, one of the central pages, and inside back cover.

4. To determine the relative value of all commonly used positions on a two-page spread for one-page, two-column, one-column, one-quarter page (two adjacent one-half columns), and one-half column advertisements.

5. To determine the effect of cartoons on the attention-holding power of advertisements appearing on either the same page with the cartoon or on the page opposite the cartoon.

III. APPARATUS AND TECHNIQUE

Two experiments were conducted with different groups of readers using the *Saturday Evening Post* for December 16, 1939. The first consisted of having one group of readers leaf through a copy while their eye-movements were photographed with the Purdue Eye-Camera.[10]

This copy was obtained three days prior to newsstand release. The readers had not, therefore, had an opportunity to see the copy prior to the experiment. It was possible to secure in this manner an objective photographic record of the time spent on each part of each advertisement by a reader while leafing through the magazine. The method used here was the same as that used by Karslake, except that the camera took three frames per second instead of sixteen. The mean and the standard deviation of the seconds spent on each part was determined for the group of readers. Hereafter, the mean time spent on a part of an advertisement will be termed a *mean time score for that part* just as the mean time spent on the whole advertisement will be termed the *mean time score for the whole advertisement.*

In the second experiment, all the advertisements were cut up into their component parts identical with those for which time was recorded

[10] Karslake, *op. cit.*

in the eye-camera experiment.[11] These parts, pasted on pieces of cardboard, were presented to the readers in heterogenous order. The length of time each reader took to associate each of the isolated parts with the product advertised by the whole advertisement to which the part belonged was measured with a stop-watch. The mean and standard deviation of the seconds required to identify the product were determined for each part. Hereafter, the mean time taken to identify a part will be termed an *identification score*.

Thus, for each part, four measures were computed—the mean and standard deviation of the seconds spent on the part for a group of readers who leafed through the magazine, and the mean and standard deviation of the seconds taken to identify the part by a group of readers when the parts were presented in isolation. The standard error of the difference and the critical ratio were computed between the means of these raw-score distributions. The probability corresponding to the area beyond the critical ratio gave the area below a zero difference point on a distribution of differences of raw scores. In other words, this area represented the per cent of the readers who had looked at the part as long or longer than was necessary to identify the advertiser.[12]

This could also be expressed as a probability, as in the following example: "There are 16 chances in 100 that a reader will look at this particular part long enough to identify the advertiser." The probability for a particular part hereafter will be termed the *probability score for that part*. This index enables an advertiser to analyze the various parts of an advertisement, but does not give a composite

[11] In both studies the number, size, and shape of the parts considered were dictated by the layout of the advertisement. Thus, if a particular advertisement had a headline, an illustration, and three separate sections of context, there were then considered to be five parts on that page.

[12] The fundamental assumption of this technique is that no spurious result arises in getting a distribution of differences by randomly matching the scores in the "time spent" distribution with the scores in the "time taken to identify" distribution. It is, therefore, necessary to know whether there is any correlation between the time taken to identify a part and the time spent on that part by a particular reader. Correlations were run for 59 parts for groups ranging from 20 to 26. After these correlations were transformed to Z scores, it was found that the average correlation was zero and that it was safe to assume no correlation existed between these two factors. Thus, no spurious result arose from the assumption of randomly matching raw scores.

index of the whole advertisement. Such a composite index, or *probability score for the whole advertisement,* was determined by taking 1 minus the product of the chances that a reader *will not look* at a particular part long enough to identify the advertiser. Thus, if the probability scores for four parts of an advertisement are .16, .20, .10, and .60, respectively, the probability that a reader will look at some part of the advertisement long enough to identify the advertiser would be 1—(.84) (.80) (.90) (.40) which equals .86. In other words, there would be 86 chances in 100 that the reader would look at one part or more long enough to identify the advertiser. This composite probability was used as the index of the worth of an advertisement It can readily be seen that, if readers spent most of their time looking at a part which in no way brought to their mind the name of the firm or the product, the composite index of the advertisement wuold be low.

Mean time spent on each part and mean time spent on the whole advertisement as well as probability scores for each part and the composite probability for the whole advertisement were carried throughout all phases of the study.

IV. RELIABILITY OF TECHNIQUE

Three steps were taken to determine the reliability of this technique. It was necessary to determine (1) the reliability of the mean time scores, (2) the reliability of the identification scores, and (3) the reliability of the probability scores. In ascertaining reliability, various comparisons were made between students and non-students to determine the efficacy of using student populations on advertising experiments.

Reliability of Mean Time Scores

There were two correlations computed relative to the mean time spent on the various parts and on the whole advertisement. The first was between students and non-students, and the second between men and women.[13] These correlations may be thought of in two ways:

[13] The following facts relative to the groups of readers mentioned here and throughout the remainder of this article are pertinent. The student groups were composed of randomly selected undergraduate students from Purdue Uni-

(1) as minimum indices of the reliability of the eye-movement experiment, and (2) as an index of relationship in regard to the way the groups looked at advertisements, that is, between men and women or between students and non-students. These may be thought of as minimum indices of reliability, because, if a correlation were computed between two halves of the same population, it would undoubtedly be higher than a correlation between two different populations when the same number of subjects was used for both.

The correlation between the mean times spent by men and by women on the whole advertisement was .88. The similar correlation between the mean times spent on the parts was .79. Both male and female samples from which these were computed consisted of approximately 15 students and 15 non-students, making a total of 30 in each sample.

The correlation between the mean times spent by students and by non-students on the whole advertisement was .85. The similar correlations between the mean times spent on the parts was .85. Both the student and non-student samples from which these were computed consisted of approximately 15 males and 15 females, making a total of 30 in each sample.

It should be pointed out here that these correlations of averages just described are subject to the Spearman-Brown Prophecy Formula:

$$r_{nn} = \frac{nr_{11}}{1 + (n-1)\, r_{11}}$$

By means of this formula, it is possible to ascertain the reliability of a single typical person in the situation and also to determine the number of people required for any desired reliability.

By using the correlation between students and non-students, which was .85 for whole advertisements, and by substituting 1/30 for n, the reliability of a single person is found to be .16.

versity and of an approximately equal representation of both sexes. The non-student groups were comprised of randomly selected adults from an industrial city of northern Indiana and of an approximately equal representation of both sexes. The male groups consisted of an approximately equal number of students and non-students. The female groups consisted of an approximately equal number of students and non-students. Since the number of subjects used varies somewhat with each experiment, this information is given in the description of the particular experiment.

By using this same reliability index (.85 between students and non-students) and by solving the formula for n, it can be seen that approximately 90 subjects (3 x 30) are needed in order to yield a reliability of .95.

Reliability of Identification Scores

Four correlations were determined in evaluating the reliability of the identification experiment. First, a correlation was determined between two non-student groups of 13 each, both of whom, upon completion of the eye-movement experiment, were given the identification of parts experiment. The correlation for these non-student groups between the mean number of seconds each took to identify the advertiser on each of 59 parts was .94. Second, a comparison was made between student and non-student groups of 30 each. Both groups were given the identification experiment immediately on completion of the eye-movement experiment. The correlation in this case between the mean number of seconds each took to identify the advertiser on each of 59 parts was .94. Third, a comparison was made between students who were given the identification experiment immediately on completion of the eye-movement experiment and students who had neither taken the eye-movement experiment nor had previously seen the magazine. The correlation between mean times taken to identify the advertiser by groups of 30 on 59 parts was .87. Fourth, a comparison was made between students who had neither taken the eye-movement experiment nor had seen the magazine and non-students who had been given the identification experiment immediately on completion of the eye-movement experiment. The correlation between mean times taken to identify the advertisers by groups of 30 on 59 parts was .96.

In summarizing the results of the reliability of the identification scores, it is possible to make the following statements which seem correct within reasonable limits:

1. Groups of above 20 in number will add little to the reliability of the identification scores on the parts.

2. Where non-student populations are wanted for a particular advertising project, student populations can be safely substituted for this part of the experiment.

3. Whether students have just seen the advertisements or whether they have never seen the advertisements seems to make little difference as far as a relative measure of the mean time taken to identify the advertiser in the various parts is concerned.

4. Non-students who have taken the identification experiment immediately on completion of the eye-movement experiment tend to spend the same relative amounts of time in identifying the advertiser for the various parts as students who have never seen the magazine.

Reliability of Probability Scores

There were two correlations computed from the probability scores on the various parts and on the whole advertisement. The first was between students and non-students, and the second between men and women. These correlations, as in the mean time correlations, may be thought of as either minimum indices of the reliability of the probability scores or as indices of relationship between the ways the groups looked at the advertisements.

The correlation between men and women was .86 when probability scores for the whole advertisements were used. The correlation between men and women was .81 when probability scores for parts of the advertisements were used. The male and female populations from which the mean time scores were computed were described under that part of the experiment. Because of the high correlations between all groups in the identification experiments, the scores from all groups were pooled. The mean time taken to identify the advertiser was determined from a total of 87 subjects, 47 of whom were males and 40 of whom were females, 26 of whom were non-students, and 61 of whom were students. These identification scores were used in computing the male, female, student, and non-student probability scores.

The correlation between students and non-students was .89 when probability scores for the whole advertisement were used. The correlation between students and non-students was .81 when probability scores for the parts of the advertisements were used. The student and non-student populations from which the mean time scores were computed were described under that part of the experiment.

As a concluding thought in this chapter, it should be pointed out that all of the obtained reliabilities—mean time scores, identification

scores, and probability scores—were amply high for the type of group measurements with which the study was concerned.

V. EVALUATION OF FIFTY-NINE ADVERTISEMENTS

All advertisements one-half column or larger in the December 16, 1939, issue of the *Saturday Evening Post* were evaluated and ranked according to both the mean time spent on the whole advertisement and the probability score for the whole advertisement. Separate rankings were made for the following populations:

	Male		Female		
Population	Student	Non-Student	Student	Non-Student	Total
1. COMBINED GROUPS	15	18	12	13	58
2. MALES—Students and Non-Students	15	18			33
3. FEMALES—Students and Non-Students			12	13	25
4. STUDENTS—Males and Females	15		12		27
5. NON-STUDENTS—Males and Females		18		13	31

The correlation between the various populations was given in the section entitled *Reliability of the Technique*. The mean time spent on the advertisement, the probability scores, and the ranks by both of these techniques as determined from each of the first three populations are given in Tables III, IV, and V.[14]

[14] Complete data on time and probability scores for the various parts are given in Appendix B of the thesis referred to in footnote 3.

The correlation between the mean time spent and the probability scores for these three populations are given below:

	Correlation between Mean Time and Probability Scores
1. COMBINED GROUPS	.48
2. MALES— Students and Non-Students	.56
3. FEMALES— Students and Non-Students	.40

TABLE III.

Evaluation of Advertisements by Mixed Group

Measures and Ranks Were Obtained by the Following Techniques: (1) Mean Time, and (2) Probability Score. The Data Were Obtained from both Males and Females. The Advertisements Are Arranged in the Order in Which They Appeared in the Magazine.

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
0	Heinz				
	1 page color	14	2.65	51.5	27
1	Squibb				
	1 page B&W**	17	2.99	47.5	22
2	Simoniz				
	2 columns B&W	37	1.86	18	42
3	Bell Telephone				
	1 page color	10	2.17	54.5	36
4	Whitman				
	1 page color	88	2.59	1	29

* The probability scores in this column indicate the chances in 100 that the advertisement will be looked at long enough for the advertiser to be identified.

** B&W is a notation for a black and white advertisement.

TABLE III (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
25	Campbell				
	1 page color	41	3.59	16	11
27	Pontiac				
	1 page color	62	4.26	4	7
28	Fisher Body				
	1 page color	28	3.08	30	20
31	Pullman				
	1 page B&W	43	4.45	15	5
32	Kaywoodie				
	1 column B&W	35	1.37	23	49
33	Parke Davis				
	1 page B&W	18	4.82	44.5	2
34	Ingrams				
	1 column B&W	23	2.03	39	38.5
35	A C Spark Plug				
	1 page color	45	3.34	11.5	16
36	Quaker State				
	2 columns color	10	1.53	54.5	46.5
37	Statler Hotel				
	2 columns color	14	3.09	51.5	19
38	Ford				
	1 page color	21	4.69	42.5	3
40–41	General Motor				
	2 pages B&W	36	4.84	21	1
42	Botany				
	1 column B&W	24	1.99	36	40
43	Philip Morris				
	1 page color	51	2.91	8	23
44	Pyroil				
	2 columns color	32	1.95	27.5	41
45	Remington-Rand				
	2 columns color	33	2.63	25.5	28

TABLE III (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
46	Arvin				
	1 page color	55	4.16	6	8
47	Alliance				
	1 column B&W	9	2.84	56	24
48	Sunbeam				
	2 columns B&W	45	2.53	11.5	32
49	Life Savers				
	2 columns B&W	36	3.55	21	13
50	Schult				
	1 column B&W	34	1.67	24	44
51	Underwood				
	1 page B&W	52	3.51	7	14
52	Miami				
	1 column B&W	36	1.64	21	45
53	Chesterfield				
	1 page color	55	3.50	6	15
54	Del Monte				
	1 column B&W	37	1.45	18	48
55	Eastman Kodak				
	1 page color	64	4.65	3	4
56	Arrow				
	1 page color	76	4.27	2	6
58	National Casket				
	2 columns B&W	13	2.80	53	25
59	Tea				
	2 columns B&W	48	2.55	9	30.5
60	G. M. Lamp				
	1/4 page B&W	23	1.83	39	43
60	Royal Duke				
	1/8 page B&W	16	1.03	50	53
60	Curtis				
	1/16 page B&W	3	.18	57.5	58

TABLE III (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
60	Whiz				
	1/8 page B&W	2	.13	59	59
61	Pennsylvania				
	2 columns B&W	27	2.24	32.5	35
62	Beau Brummel				
	1/2 column B&W	28	1.26	30	51
62	Hollycourt				
	1/2 column B&W	17	.98	47.5	54
63	Weed				
	2 columns B&W	24	2.71	36	26
65	Congress				
	1 page B&W	23	3.56	39	12
66	Yale				
	1 column B&W	22	2.03	41	38.5
67	Band Aid				
	1/4 page B&W	32	2.48	27.5	34
67	Steem Electric				
	1/4 page B&W	33	1.53	25.5	46.5
68	Dole				
	1/2 column B&W	17	.71	47.5	56
69	Black & Decker				
	1/4 page B&W	26	2.50	34	33
69	Curtis				
	1/4 page B&W	21	.72	42.5	55
70	Cheney				
	1/2 column B&W	18	1.35	44.5	50
71	Roto-Shaver				
	2 columns B&W	17	3.32	47.5	17
71	Wilsonite				
	1/8 page B&W	3	.39	57.5	57
72	Amer. Insurance				
	2 columns B&W	24	2.55	36	30.5

TABLE III (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
73	Vicks				
	½ column B&W	37	1.25	18	52
74	Curtis				
	2 columns B&W	27	2.08	32.5	37
75	Swifts				
	2 columns color	44	3.00	13.5	21
77	Nucoa				
	1 page color	44	4.08	13.5	9
79	Capital Stock				
	1 page B&W	28	3.99	30	10
81	Greyhound				
	1 page color	47	3.20	10	18

TABLE IV.

Evaluation of Advertisements by Group of Males

Measures and Ranks Were Obtained by the Following Techniques: (1) Mean Time, and (2) Probability Score. The Data Were Obtained from a Group of Males. The Advertisements Are Arranged in the Order in Which They Appeared in the Magazine.

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
0	Heinz				
	1 page color	16	3.32	52.5	25
1	Squibb				
	1 page B&W	17	3.31	49	26
2	Simoniz				
	2 columns B&W	37	2.11	24	43
3	Bell Telephone				
	1 page color	5	2.29	56	40
4	Whitman				
	1 page color	89	2.81	1	34
25	Campbell				
	1 page color	43	3.88	15.5	18
27	Pontiac				
	1 page color	68	4.94	4	9
28	Fisher Body				
	1 page color	29	3.54	34.5	23
31	Pullman				
	1 page B&W	50	5.45	13	5
32	Kaywoodie				
	1 column B&W	42	1.70	17	49
33	Parke Davis				
	1 page B&W	25	5.30	39	7
34	Ingrams				
	1 column B&W	22	2.19	43.5	42
35	A C Spark Plug				
	1 page color	54	4.21	8.5	12

TABLE IV (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
36	Quaker State				
	2 columns B&W	10	1.78	54	46.5
37	Statler Hotel				
	2 columns color	16	3.98	52.5	15
38	Ford				
	1 page color	30	5.71	33	2
40–41	General Motor				
	2 pages B&W	33	5.50	30.5	3.5
42	Botany				
	1 column B&W	33	2.50	30.5	35
43	Phillip Morris				
	1 page color	51	3.25	11	27
44	Pyroil				
	2 columns color	34	2.32	28	38
45	Remington-Rand				
	2 columns color	40	3.35	19	24
46	Arvin				
	1 page color	65	5.50	5	3.5
47	Alliance				
	1 column B&W	9	3.06	55	28
48	Sunbeam				
	2 columns B&W	51	2.98	11	31
49	Life Savers				
	2 columns B&W	40	3.69	19	20
50	Schult				
	1 column B&W	34	1.91	28	44
51	Underwood				
	1 page B&W	60	4.29	6	11
52	Miami				
	1 column B&W	38	1.71	21.5	48
53	Chesterfield				
	1 page color	57	3.97	7	16

TABLE IV (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
54	Del Monte 1 column B&W	37	1.78	24	46.5
55	Eastman Kodak 1 page color	69	5.92	3	1
56	Arrow 1 page color	79	5.20	2	8
58	National Casket 2 columns B&W	18	2.97	48	30
59	Tea 2 columns B&W	49	2.88	14	32
60	G. M. Lamp ¼ page B&W	28	2.33	36.5	37
60	Royal Duke ⅛ page B&W	16	1.12	52.5	53
60	Curtis $\frac{1}{16}$ page B&W	3	.25	57.5	58
60	Whiz ⅛ page B&W	2	.13	59	59
61	Pennsylvania 2 columns B&W	29	2.48	34.5	36
62	Beau Brummel ½ column B&W	31	1.60	32	51
62	Hollycourt ½ column B&W	16	.85	52.5	56
63	Weed 2 columns B&W	28	3.79	36.5	19
65	Congress 1 page B&W	24	4.17	41	14
66	Yale 1 column B&W	22	2.30	43.5	39
67	Band Aid ¼ page B&W	34	2.82	28	33

TABLE IV (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
67	Steem Electric				
	¼ page B&W	37	1.83	24	45
68	Dole				
	½ column B&W	19	1.03	47	54
69	Black & Decker				
	¼ page B&W	35	3.62	26	21
69	Curtis				
	¼ page B&W	21	.93	45	55
70	Cheney				
	½ column B&W	20	1.52	46	52
71	Roto-Shaver				
	2 columns B&W	27	4.78	38	10
71	Wilsonite				
	⅛ page B&W	3	.41	57.5	57
72	Amer. Insurance				
	2 columns B&W	24	2.99	41	29
73	Vicks				
	½ column B&W	40	1.64	19	50
74	Curtis				
	2 columns B&W	24	2.22	41	41
75	Swifts				
	2 columns color	54	3.57	8.5	22
77	Nucoa				
	1 page color	43	4.19	15.5	13
79	Capital Stock				
	1 page B&W	38	5.44	21.5	6
81	Greyhound				
	1 page color	51	3.94	11	17

TABLE V.

Evaluation of Advertisements by Group of Females

Measures and Ranks Were Obtained by the Following Techniques: (1) Mean Time, and (2) Probability Score. The Data Were Obtained from a Group of Females. The Advertisements Are Arranged in the Order in Which They Appeared in the Magazine.

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
0	Heinz				
	1 page color	11	1.90	51.5	32
1	Squibb				
	1 page B&W	17	2.63	41	13
2	Simoniz				
	2 columns B&W	30	1.56	21	37
3	Bell Telephone				
	1 page color	14	2.02	48	25.5
4	Whitman				
	1 page color	88	2.32	1	20
25	Campbell				
	1 page color	36	3.12	13.5	8
27	Pontiac				
	1 page color	53	3.35	3	5.5
28	Fisher Body				
	1 page color	28	2.48	24.5	16.5
31	Pullman				
	1 page B&W	31	3.16	19	7
32	Kaywoodie				
	1 column B&W	25	.91	29.5	51.5
33	Parke Davis				
	1 page B&W	14	4.22	48	1
34	Ingrams				
	1 column B&W	23	1.82	32.5	34
35	A C Spark Plug				
	1 page color	35	2.23	15.5	22

TABLE V (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
36	Quaker State				
	2 columns color	10	1.16	53.5	44.5
37	Statler Hotel				
	2 columns color	11	1.92	51.5	30.5
38	Ford				
	1 page color	49	3.37	4	4
40–41	General Motor				
	2 pages B&W	22	3.98	34.5	2
42	Botany				
	1 column B&W	12	1.36	50	40
43	Philip Morris				
	1 page color	48	2.48	5	16.5
44	Pyroil				
	2 columns color	30	1.47	21	39
45	Remington-Rand				
	2 columns color	24	1.69	31	35
46	Arvin				
	1 page color	38	2.34	12	19
47	Alliance				
	1 column B&W	6	2.54	56	15
48	Sunbeam				
	2 columns B&W	29	1.92	23	30.5
49	Life Savers				
	2 columns B&W	26	3.35	27.5	5.5
50	Schult				
	1 column B&W	32	1.31	18	42
51	Underwood				
	1 page B&W	42	2.39	10.5	18
52	Miami				
	1 column B&W	36	1.55	13.5	38
53	Chesterfield				
	1 page color	46	2.83	8	11

TABLE V (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
54	Del Monte 1 column B&W	33	.99	17	49.5
55	Eastman Kodak 1 page color	43	2.88	9	10
56	Arrow 1 page color	67	2.97	2	9
58	National Casket 2 columns B&W	7	2.56	55	14
59	Tea 2 columns B&W	47	2.09	6.5	24
60	G. M. Lamp ¼ page B&W	16	1.16	44.5	44.5
60	Royal Duke ⅛ page B&W	14	.91	48	51.5
60	Curtis 1/16 page B&W	2	.09	58	59
60	Whiz ⅛ page B&W	2	.13	58	58
61	Pennsylvania 2 columns B&W	30	1.93	21	29
62	Beau Brummel ½ column B&W	28	.81	24.5	53
62	Hollycourt ½ column B&W	17	1.15	41	46
63	Weed 2 columns B&W	22	1.29	34.5	43
65	Congress 1 page B&W	17	2.71	41	12
66	Yale 1 column B&W	18	1.67	38	36
67	Band Aid ¼ page B&W	26	2.02	27.5	25.5

TABLE V (Cont.)

Page	Advertisement	Obtained Measures		Ranks	
		Probability Score*	Mean Time	Probability Score	Mean Time
67	Steem Electric				
	¼ page B&W	27	1.12	26	47.5
68	Dole				
	½ column B&W	15	.27	44.5	57
69	Black & Decker				
	¼ page B&W	17	.99	41	49.5
69	Curtis				
	¼ page B&W	17	.43	41	55
70	Cheney				
	½ column B&W	16	1.12	44.5	47.5
71	Roto-Shaver				
	2 columns B&W	10	1.33	53.5	41
71	Wilsonite				
	⅛ page B&W	2	.35	58	56
72	Amer. Insurance				
	2 columns B&W	21	1.96	36.5	28
73	Vicks				
	½ column B&W	35	.70	15.5	54
74	Curtis				
	2 columns B&W	25	1.89	29.5	33
75	Swifts				
	2 columns color	23	2.25	32.5	21
77	Nucoa				
	1 page color	42	3.92	10.5	3
79	Capital Stock				
	1 page B&W	21	2.00	36.5	27
81	Greyhound				
	1 page color	47	2.15	6.5	23

VI. EVALUATION OF POSITION IN MAGAZINE

The evaluation of the relative attention-holding power of various locations in the magazine included a comparison of the following four positions: (a) the inside front cover, (b) the page opposite the first story, (c) one of the central pages, and (d) the inside back cover. The relative value of these positions, measured in terms of *both* mean time and probability scores, was determined for each of four advertisements.

Four groups, each composed of non-student men and women readers, were asked to leaf through the December 16, 1939, issue of the *Saturday Evening Post*. This magazine, as stated before, was obtained three days prior to newsstand release. The readers, therefore, had not had an opportunity to see the magazine prior to the experiment. One group leafed through a standard copy of the magazine exactly as it appeared later on the newsstands. In the standard copy, the following advertisements appeared on the pages studied: (a) front inside cover, Heinz, (b) page before the first story, Whitman, (c) page 56 or the central page, Arrow, (d) back inside cover, Greyhound. The other three groups leafed through copies of the same issue which had been altered by cutting out from extra issues of the magazine copies of the advertisements being studied and pasting these upon the desired advertisement in the "made-up" magazines. The following tabulation shows the magazine arrangements[15] for each of the four groups:

	Inside Front Cover	Page before First Story	Page 56	Inside Back Cover
Group 1. Magazine Unaltered	Heinz	Whitman	Arrow	Greyhound
Group 2.	Greyhound	Heinz	Whitman	Arrow
Group 3.	Arrow	Greyhound	Heinz	Whitman
Group 4.	Whitman	Arrow	Greyhound	Heinz

It can be seen that each advertisement appeared in each of the four positions and that, when a comparison of the totals was made, the inherent effects of the groups were cancelled out.

[15] Full information as to the position in the magazine, the size of the advertisement, and the color of the advertisement relative to all the advertisements mentioned in the remainder of this article may be found in Table III.

The Arrow advertisement in each of the four positions is shown in Figures 1 and 2.[16]

The results of the measurements of the mean time spent on each advertisement are given in Tables VI and VII. Table VII reveals that there was only one statistically significant difference between positions. The inside back cover was found to be better than the inside front cover. The figures in Table VI show that, for the four advertisements studied, the average time spent on the front inside cover was 3.03 seconds; whereas, the average time spent on the back inside cover was 5.24 seconds. The difference of 2.21 seconds was 3.3 times its standard error and, hence, was statistically significant. It may be interesting to note, from Table VI, that the differences, although not statistically significant, were all in favor of the back part of the magazine.

The results of the measurements of the probability scores are given in Tables VIII and IX. The standard error of measurement based on the probability score correlation between students and non-students was used as a measure of dispersion for all probability scores. This correlation for groups of 30 between students and non-students, without reference to sex, was .89. The correlation of probability scores

TABLE VI.

Mean Time in Seconds Spent on Four Advertisements in Four Different Positions throughout the Magazine

Advertisement Appearing in the Dec. 16, 1939, Issue of the **Saturday Evening Post**	Page											
	Front Inside Cover—Page 0			Page before First Story—Page 4			Central Page—Page 56			Back Inside Cover—Page 81		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
Heinz	2.43	1.54	25	4.11	4.21	30	4.90	5.20	35	5.37	4.39	26
Whitman	1.84	1.65	22	2.46	1.66	27	3.52	2.22	31	3.99	2.81	34
Arrow	4.15	4.22	31	4.85	6.31	22	2.85	1.62	32	8.32	10.34	31
Greyhound	3.21	3.99	28	2.67	5.42	31	3.63	2.35	27	2.07	2.54	26
Average	3.03	3.36	106	3.45	4.76	110	3.76	3.36	125	5.24	6.36	117

[16] Pictures of the Heinz, Whitman, and Greyhound Advertisements, each on the inside front cover, are given in Appendx C of the thesis referred to in footnote 3.

Fig. 1. *Arrow Advertisement on the inside front cover and the page before the first story.*

Fig. 2. *Arrow Advertisement on page 56, which was one of the central pages, and on the back inside cover.*

TABLE VII.

Significance of the Differences between Positions with reference to Table VI

Difference in Favor of Underlined	Difference	S. E. (diff.)	C. R.
0 vs. 4	.42	.57	.7
0 vs. 56	.73	.45	1.6
0 vs. 81	2.21	.68	3.3
4 vs. 56	.31	.55	.6
4 vs. 81	1.79	.75	2.4
56 vs. 81	1.48	.66	2.2

TABLE VIII.

Probability Scores on Four Advertisements in Four Different Positions throughout the Magazine

Advertisements Appearing in the Dec. 16, 1939, Issue of the *Saturday Evening Post*	Page			
	Front Inside Cover—Page 0	Page before First Story—Page 4	Central Page —Page 56	Back Inside Cover—Page 81
	%	%	%	%
Heinz	16	19	29	23
Whitman	86	88	91	91
Arrow	71	82	65	89
Greyhound	55	53	55	47

The Correlation for groups of 30, without reference to sex, between non-students and students was .89. The standard error of a single score based upon this correlation was 5.82.

TABLE IX.

Significance of the Differences between Positions with reference to Table VIII

Difference in Favor of Underlined	Advertisement	Difference	C. R.	Probability	λ^2	Level of Significance
0 vs. 4	Heinz	3	.4	.345	6.79	70%
	Whitman	2	.2	.421		
	Arrow	11	1.3	.097		
	Greyhound	—2	.2	.421		
0 vs. 56	Heinz	13	1.6	.055	6.94	70%
	Whitman	5	.6	.274		
	Arrow	—6	.7	.242		
	Greyhound	0	0	.500		
0 vs. 81	Heinz	7	.9	.184	10.83	30%
	Whitman	5	.6	.274		
	Arrow	18	2.2	.014		
	Greyhound	—8	1.0	.159		
4 vs. 56	Heinz	10	1.2	.115	.15	100%
	Whitman	3	.4	.345		
	Arrow	—17	2.1	.018		
	Greyhound	2	.2	.421		
4 vs. 81	Heinz	4	.5	.309	5.03	80%
	Whitman	3	.4	.345		
	Arrow	7	.9	.184		
	Greyhound	—6	.7	.242		
56 vs. 81	Heinz	6	.7	.242	4.53	90%
	Whitman	0	0	.500		
	Arrow	—24	2.9	.002		
	Greyhound	8	1.0	.159		

In this table and throughout the remainder of this article, differences opposite in direction to the general trend were handled by affixing the negative sign to the difference.

between two groups of non-students would have been a better index of correlation to have used in computing the standard error of measurement. Data for this correlation were not available except for groups of 15. Since it would have entailed considerable additional calculation to have obtained this and since the correlation between students and non-students for groups of 30 (the same as the size of the groups between which comparisons were made) was .89, it was decided to use this correlation rather than the other. This correlation may be thought of as a minimum index of reliability since a correlation between two halves of the same population undoubtedly would have been higher. The standard error of a single score based upon this correlation was 5.82. The standard error of the difference between any two probability scores was 8.23. By means of this standard error of the difference, the critical ratios and probabilities from these critical ratios were determined for each difference. The method used in this study for combining probabilities from the independent tests of significance (each advertisement used in studying the same factor was considered a test) is outlined by Lindquist as follows:

1. Find the common logarithm of each probability.
2. Add these logarithms and change the sign of the result.
3. Multiply this result by 4.60517 ($= 2 \times 2.302585$) to get the composite λ^2 (the number 2.302585 is the "modulus constant" which transforms a common logarithm to a natural logarithm). [Look up the resulting λ^2 to determine the level of significance.]
4. The number of d.f. for the composite λ^2 is twice the number of probabilities involved.[17]

Table IX reveals that there was no difference significant above the 30% level. (Significance would have to be established on the 5% or 1% level.) It seems safe to conclude that there are relatively no differences between the four locations studied.

VII. EVALUATION OF POSITION ON SPREAD

The study of the relative attention-holding power of various positions on a two-page spread involved an evaluation of all commonly used positions for one-page, two-column, one-column, one-quarter

[17] E. F. Lindquist, *Statistical Analysis of Educational Research*. New York: Houghton Mifflin Co., 1940, p. 45.

page (two adjacent one-half columns), and one-half column advertisements.

The readers used throughout this section of the study were divided into four groups. These groups were the same as those cited in the section entitled *Position in the Magazine*. Copies of the issue of the *Saturday Evening Post* for December 16, 1939, were obtained three days prior to newsstand release. They were altered in the same manner, as in the section just cited, that is, by pasting cut-out advertisements from extra copies upon the desired advertisement in the "made-up" issues. All competitive material was held constant for the left and right side of the page.

One-Page Advertisements

First, it was determined whether the left or right side of the page was better for a one-page advertisement. One group of readers leafed through a standard copy of the magazine; whereas, the other three groups leafed through copies of the same issue which had been altered. The following tabulation shows the magazine arrangements for each of the four groups:

Group 1	Standard issue—Eastman Kodak and Capital Stock, the two advertisements studied, had cartoons on opposite pages.
Group 2	Pages reversed from that of standard issue with competitive material the same.
Group 3	Standard issue with cartoons blocked out.
Group 4	Pages reversed from that of standard issue with cartoons blocked out.

Blocking the cartoons out with printed material similar to the copy around the cartoon was not essential in studying the relative value of right or left pages, but was necessary for certain other parts of the investigation.

The Eastman Kodak advertisement in each of the four arrangements is shown in Figures 3 and 4.[18]

The results of the measurements of the mean time spent on each advertisement are given in Table X. The figures show that, for the

[18] The Capital Stock advertisement in each of the four arrangements is given in Appendix C of the thesis referred to in footnote 3.

Fig. 3. *Eastman Kodak Advertisement as it appeared to Group 1 (above) and to Group 2 (below).*

Fig. 4. *Eastman Kodak Advertisement as it appeared to Group 3 (above) and to Group 4 (below).*

TABLE X.

Mean Time in Seconds Spent on Four One-Page Advertisements When Each Appeared on the Left and Right-Hand Pages

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread					
	Left-Hand Page			Right-Hand Page		
	Mean	S. D.	N	Mean	S. D.	N
Eastman with Cartoon	2.64	3.79	27	3.69	2.36	33
Eastman without Cartoon	5.99	5.13	35	6.39	7.16	31
Capital Stock with Cartoon	4.91	5.62	34	3.69	3.47	26
Capital Stock without Cartoon	6.70	5.58	31	4.63	3.50	31
Average	4.69	4.78	127	5.15	5.22	121

Difference	.46
S. E. (diff.)	.64
C. R.	.7

TABLE XI.

Probability Scores on Four One-Page Advertisements When Each Appeared on the Left and Right-Hand Pages

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread				
	Left-Hand Page	Right-Hand Page	Difference	C. R.	Probability
	%	%			
Eastman with Cartoon	48	48	0	0	.500
Eastman without Cartoon	67	69	—2	.2	.421
Capital Stock with Cartoon	36	26	10	1.2	.115
Capital Stock without Cartoon	38	31	9	1.1	.136

λ^2 7.97

The collective results are significant at the 50% level.

Fig. 5. *Pyroil and Remington-Rand Advertisements as they appeared to Group 1 (above) and to Group 2 (below).*

four arrangements studied, the average time spent on the left-hand page was 4.69 seconds; whereas, the average time spent on the right-hand page was 5.15 seconds. The difference of .46 was only .77 its standard error and, hence, this difference was not significant.

The results of the measurements of the probability scores are given in Table XI. This table reveals that the difference was only significant at the 50% level, which indicates that there was no significant difference between right and left pages for one-page advertisements.

Two-Column Advertisements

Second, the relative value of the left and right outside positions on a two-page spread was determined for two-column advertisements.

In this part of the study, the advertisements were altered and presented to groups in the same manner as was described for one-page advertisements. The Pyroil and Remington-Rand advertisements in each of the four arrangements are given in Figures 5 and 6.[19]

The results of the measurements of the mean time spent on each advertisement are given in Table XII. This table shows that, for the six arrangements studied, the average time spent on the right outside columns was 3.31 seconds; whereas, the average time spent on the left outside columns was 2.37 seconds. The difference of .94 was 3.1 times its standard error and, hence, this difference was statistically significant.

The results of the measurements of the probability scores are given in Table XIII. This table reveals that the collective results were significant at the 1% level. By both techniques the right outside columns were shown superior to the left outside columns for two-column advertisements.

One-Column Advertisements

Third, the relative value of the left and right outside columns on a two-page spread was determined for a one-column advertisement.

In this part of the study, the advertisements were altered and presented to groups in the manner described for one-page advertisements. Figures 3 and 4, previously given for one-page advertisements, illus-

[19] Pictures of the Weed advertisement in each of the four arrangements are given in Figures 9 and 10.

Fig. 6. *Pyroil and Remington-Rand Advertisements as they appeared to Group 3 (above) and to Group 4 (below).*

trate the four arrangements in which the Del Monte advertisement appeared.

The results of the measurements of the mean time spent on each advertisement are given in Table XIV. This table shows that, for the four arrangements studied, the average time spent on the right outside column was 3.81 seconds; whereas, the average time spent on the left outside column was 2.10 seconds. The difference of 1.71 was 4.8 times its standard error and, hence, it was statistically significant.

TABLE XII.

Mean Time in Seconds Spent on Six Two-Column Advertisements When Each Appeared in the Outside Positions on the Left and Right-Hand Pages

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread					
	Outside Column on Left-Hand Page			Outside Column on Right-Hand Page		
	Mean	S. D.	N	Mean	S. D.	N
Pyroil with Cartoon	1.77	1.65	32	2.81	2.93	34
Pyroil without Cartoon	3.24	2.23	31	2.94	2.06	23
Remington-Rand with Cartoon	1.78	2.50	34	2.64	2.08	32
Remington-Rand without Cartoon	2.29	2.07	23	4.60	4.04	31
Weed with Inversion	2.52	2.14	27	4.01	3.19	31
Weed without Inversion	2.65	2.20	34	2.88	3.44	30
Average	2.37	2.22	181	3.31	3.16	181

Difference	.94
S. E. (diff.)	.30
C. R.	3.1

TABLE XIII.

Probability Scores on Six Two-Column Advertisements When Each Appeared in the Outside Position on the Left and Right-Hand Pages

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread				
	Outside Column on Left-Hand Page	Outside Column on Right-Hand Page	Difference	C. R.	Probability
	%	%			
Pyroil with Cartoon	31	40	9	1.1	.136
Pyroil without Cartoon	39	40	1	.1	.460
Remington-Rand with Cartoon	16	33	17	2.1	.018
Remington-Rand without Cartoon	26	44	18	2.2	.014
Weed with Inversion	26	32	6	.7	.242
Weed without Inversion	26	26	0	0	.500

λ^2 26.34

The collective results are significant at the 1% level.

TABLE XIV.

Mean Time in Seconds Spent on Four One-Column Advertisements When Each Appeared in the Outside Column on the Left and Right-Hand Pages

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread					
	Outside Column on Left-Hand Page			Outside Column on Right-Hand Page		
	Mean	S. D.	N	Mean	S. D.	N
Del Monte with Cartoon	1.58	2.17	33	3.20	2.56	27
Del Monte without Cartoon	2.00	1.70	31	5.39	3.91	35
Yale Lock with Inversion	2.71	1.66	31	2.61	1.59	27
Yale Lock without Inversion	2.13	1.74	28	3.62	4.25	34
Average	2.10	1.88	123	3.81	3.53	123

Difference	1.71
S. E. (diff.)	.36
C. R.	4.8

The results of the measurements of the probability scores are given in Table XV. This table reveals that the collective results were significant at the 1% level. By both techniques, the right outside column was shown superior to the left outside column for a one-column advertisement.

One-Quarter Page (two adjacent one-half columns) Advertisements

Fourth, the relative value of the following positions on a two-page spread was determined for a one-quarter page advertisement: (a) upper left corner, (b) lower left corner, (c) upper right corner, (d) lower right corner. The Johnson Band Aid and Steem Electric one-fourth page advertisements were studied. In this part of the study, the advertisements were again altered and presented to groups in the manner described for one-page advertisements. One group leafed through a standard copy of the magazine; whereas, the other three groups leafed through copies of this issue which had been altered. The following tabulation shows the magazine arrangements for each of the four groups:

	Upper Left Corner	Lower Left Corner	Upper Right Corner	Lower Right Corner
Group 1. Magazine Unaltered			Band Aid	Steem Electric
Group 2.			Steem Electric	Band Aid
Group 3.	Band Aid	Steem Electric		
Group 4.	Steem Electric	Band Aid		

It readily can be seen that both the Johnson Band Aid and Steem Electric advertisements appeared on each of the four corners of the spread. These two advertisements in each of the four positions are shown in Figures 7 and 8.

TABLE XV.

Probability Scores on Four One-Column Advertisements When Each Appeared in the Outside Column on the Left and Right-Hand Pages

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread				
	Outside Column on Left-Hand Page	Outside Column on Right-Hand Page	Difference	C. R.	Probability
	%	%			
Del Monte with Cartoon	39	49	10	1.2	.115
Del Monte without Cartoon	39	65	26	3.2	.001
Yale Lock with Inversion	25	22	—3	.4	.345
Yale Lock without Inversion	22	43	21	2.6	.005

λ^2 26.61

The collective results are significant at the 1% level.

The results of the measurements of the mean time spent on each advertisement are given in Tables XVI and XVII. Table XVI reveals that there was only one statistically significant difference between the

Fig. 7. *Johnson Band Aid and Steem Electric Advertisements as they appeared to Group 1 (above) and to Group 2 (below).*

Fig. 8. *Johnson Band Aid and Steem Electric Advertisements as they appeared to Group 3 (above) and to Group 4 (below).*

four positions. The upper right corner was found to be better than the lower left corner. It is interesting to note, however, that there were two other differences which approached significance. The upper left corner and the lower right corner, when compared with the lower left corner, had differences 2.1 and 2.3 times their standard errors, respectively. Hence, it seemed from this experiment that there was probably one poor position, the lower left corner, and that there was very little difference between the other three corners for a one-quarter page advertisement.

The results of the measurements of the probability scores are given in Tables XVIII and XIX. Table XIX reveals that there were two differences significant at the 5% level. The upper left and upper right were significantly better than the lower left corner. This, to a certain degree, corroborates the finding by the mean time technique.

One-Half Column Advertisements

The last problem under this section was to determine the relative value of the following positions on a two-page spread for a one-half column advertisement: (a) upper left corner, (b) lower left corner, (c) upper right corner, and (d) lower right corner. The Beau Brummell and Hollycourt one-half column advertisements were studied. The advertisements were altered and presented to groups in the fashion described for one-page advertisements. One group leafed through a standard copy of the magazine; whereas, the other three groups leafed through issues which had been altered. The following tabulation shows the magazine arrangements for each of the four groups:

	Upper Left Corner	Lower Left Corner	Upper Right Corner	Lower Right Corner
Group 1. Magazine Unaltered	Beau Brummell	Holly-court		
Group 2.	Holly-court	Beau Brummell		
Group 3.			Beau Brummell	Holly-court
Group 4.			Holly-court	Beau Brummell

TABLE XVI.

Mean Time in Seconds Spent on Two One-Quarter Page Advertisements When Each Appeared in Each of the Four Corners of the Spread

Advertisements Appearing in the Dec. 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread											
	Upper Left			Lower Left			Upper Right			Lower Right		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
Band Aid	3.21	4.79	34	1.39	1.19	27	2.65	2.03	28	2.27	1.44	31
Steem Electric	1.39	1.24	27	1.30	1.60	34	2.71	2.17	31	1.82	1.81	28
Average	2.40	3.78	61	1.34	1.43	61	2.68	2.10	59	2.06	2.10	59

TABLE XVII.

Significance of the Differences between Positions with reference to Table XVI

Difference in Favor of Underlined	Difference	S.E. (diff.)	C. R.
U.L. vs. L.L.	1.06	.51	2.1
U.L. vs. U.R.	.28	.55	.5
U.L. vs. L.R.	.34	.55	.6
L.L. vs. U.R.	1.34	.32	4.2
L.L. vs. L.R.	.72	.32	2.3
U.R. vs. L.R.	.62	.37	1.7

TABLE XVIII.

Probability Scores on Two One-Quarter Page Advertisements When Each Appeared on Each of the Four Corners of the Spread

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread			
	Upper Left	Lower Left	Upper Right	Lower Right
	%	%	%	%
Band Aid	45	30	33	30
Steem Electric	30	30	44	37

U.L. vs. UR.

TABLE XIX.

Significance of the Differences between Positions with reference to Table XVIII

Difference in Favor of Underlined	Advertisement	Difference	C.R.	Probability	λ^2	Level of Significance
U.L. vs. L.L.	Band Aid Steem Electric	22 0	2.7 0	.003 .500	13.00	2%
U.L. vs. U.R.	Band Aid Steem Electric	12 —14	1.5 1.7	.067 .045	.80	95%
U.L. vs. L.R.	Band Aid Steem Electric	15 —7	1.8 .9	.036 .184	3.26	70%
L.L. vs. U.R.	Band Aid Steem Electric	10 14	1.2 1.7	.115 .044	10.57	5%
L.L. vs. L.R.	Band Aid Steem Electric	7 7	.9 .9	.184 .184	6.77	20%
U.R. vs. L.R.	Band Aid Steem Electric	3 7	.4 .9	.345 .184	5.51	30%

Both the Beau Brummell and Hollycourt advertisements appeared on each of the four corners of the spread, as can be seen from Figures 9 and 10.

The results of the measurements of the mean time spent on each advertisement are given in Tables XX and XXI. Table XX reveals that there were no differences statistically significant. The upper right and lower right corners, each versus the lower left corner, approached significance with differences of 2.4 and 2.6 times their standard errors, respectively. Evidence again points to the fact that the lower left corner is a bad corner, but this evidence cannot be held as conclusive.

The results of the measurements of the probability scores are given in Tables XXII and XXIII. Table XXIII reveals that there was no difference which in any way could be judged significant.

In summary of this entire study of position on the spread, it seems that the following statements are safe within reasonable limits:

1. There is no difference between the left and right side of the page for one-page advertisements.

Fig. 9. *Beau Brummell and Hollycourt Advertisements as they appeared to Group 1 (above) and to Group 2 (below).*

Fig. 10. *Beau Brummell and Hollycourt Advertisements as they appeared to Group 3 (above) and to Group 4 (below).*

2. The outside columns on the right side of the spread are better than the outside columns on the left side of the spread for both two-column and one-column advertisements.

3. There is probably one bad corner on a two-page spread for one-quarter page and one-half column advertisements. This corner is the lower left corner.

TABLE XX.

Mean Time in Seconds Spent on Two One-Half Column Advertisements When Each Appeared in Each of the Four Corners of the Spread

Advertisements Appearing in the Dec. 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread											
	Upper Left			Lower Left			Upper Right			Lower Right		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
Beau Brummell	1.53	1.68	30	1.13	1.81	31	2.70	4.36	34	1.23	1.08	27
Hellycourt	1.59	1.75	31	1.09	1.41	30	1.75	1.54	27	2.74	3.05	34
Total	1.56	1.71	61	1.11	1.62	61	2.28	3.45	61	2.07	2.50	61

TABLE XXI.

Significance of the Differences between Positions with reference to Table XX

Difference in Favor of Underlined	Difference	S.E. (diff.)	C.R.
U.L. vs. L.L.	.45	.30	1.5
U.L. vs. U.R.	.72	.49	1.5
U.L. vs. L.R.	.51	.39	1.3
L.L. vs. U.R.	1.17	.48	2.4
L.L. vs. L.R.	.96	.37	2.6
U.R. vs. L.R.	.21	.54	.4

TABLE XXII.

Probability Scores on Two One-Half Column Advertisements When Each Appeared on Each of the Four Corners of the Spread

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Position on Spread			
	Upper Left	Lower Left	Upper Right	Lower Right
	%	%	%	%
Beau Brummell	29	28	42	26
Hollycourt	19	17	16	22

TABLE XXIII.

Significance of the Differences between Positions with reference to Table XXII

Difference in Favor of Underlined	Advertisement	Difference	C.R.	Probability	λ^2	Level of Significance
U.L. vs. L.L.	Beau Brummell	3	.4	.345	0	100%
	Hollycourt	3	.4	.345		
U.L. vs. U.R.	Beau Brummell	13	.6	.054	3.71	50%
	Hollycourt	—3	.4	.345		
U.L. vs. L.R.	Beau Brummell	3	.4	.345	0	100%
	Hollycourt	3	.4	.345		
L.L. vs. U.R.	Beau Brummell	14	1.7	.045	4.65	50%
	Hollycourt	—1	.1	.460		
L.L. vs. L.R.	Beau Brummell	—2	.2	.421	.86	95%
	Hollycourt	5	.6	.274		
U.R. vs. L.R.	Beau Brummell	16	1.9	.029	4.24	50%
	Hollycourt	—6	.7	.242		

VIII. DISTRACTING EFFECT OF NEARBY CARTOONS ON ADVERTISEMENTS

The study of the distracting effect of nearby cartoons involved an investigation of the following arrangements: (1) when the cartoon appeared opposite a full-page advertisement, and (2) when the cartoon

appeared on the same page with a two-column or one-column advertisement.

In this part of the study, the advertisements were altered and presented to groups in the same manner as was described under *Position in the Magazine*. One group leafed through a standard copy of the magazine. The other three groups leafed through copies of the same issue which had been altered. The following tabulation shows the magazine arrangements for each of the four groups:

Group 1. Magazine unaltered.

Group 2. Magazine altered by blocking out cartoons near certain advertisements with printed material similar to the copy appearing around the cartoon.

Group 3. Magazine altered by interchanging certain advertisements and cartoons from left to right page, or vice versa.

Group 4. Magazine altered by blocking out cartoons near certain advertisements and changing advertisements from left to right page, or vice versa.

Figures 3 and 4, under the section entitled *Position on the Spread*, show four arrangements of the Eastman Kodak and Del Monte advertisements. Two of these arrangements are with a cartoon and two without a cartoon. Figures 5 and 6, under the same section, illustrate the Remington-Rand and Pyroil advertisements with and without a cartoon.[20]

The results of the measurements of the mean time spent on each one-page advertisement with a cartoon on the opposite page are given in Table XXIV. This table reveals that, for the four arrangements studied, the average time spent was 4.02 seconds when the nearby cartoon was present; whereas, when the cartoon had been eliminated, this average was raised to 5.98 seconds. This difference of 1.96 seconds was 3.1 times its standard error and, hence, was significant from a statistical viewpoint.

The results of the measurements of the probability scores for one-page advertisements are given in Table XXV. This table reveals that,

[20] Pictures of the Capital Stock advertisement, which was a full-page advertisement with a cartoon on the opposite page, are given in four arrangements in Appendix C of the thesis referred to in footnote 3.

for the composite results, the difference, in favor of the arrangement with the cartoon blanked out, was significant at the 1% level.

The results of the measurements of the mean time spent on each two-column and one-column advertisement with a cartoon on the same page are given in Table XXVI. This table reveals that, for the four arrangements studied, the average time spent was 2.24 seconds when the nearby cartoon was present; whereas, when the cartoon had been eliminated, this average was raised to 3.72 seconds. This difference of 1.48 seconds was 3.8 times its standard error and, hence, was significant from a statistical viewpoint.

The results of the measurements of the probability scores for two-column and one-column advertisements with and without a cartoon on the same page are given in Table XXVII. This table reveals that, for the composite results of the four arrangements, the difference, in favor of the arrangement with the cartoon blanked out, was significant at the 5% level.

TABLE XXIV.

Mean Time in Seconds Spent on Four One-Page Advertisements When Each Appeared with and without a Cartoon on the Opposite Page

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Effect of Cartoons					
	With Cartoon			Without Cartoon		
	Mean	S.D.	N	Mean	S.D.	N
Capital Stock on Left-Hand Page	4.91	5.62	34	4.63	3.50	26
Capital Stock on Right-Hand Page	3.69	3.47	26	6.70	5.58	31
Eastman Kodak on Left-Hand Page	2.64	3.79	27	5.99	5.13	35
Eastman Kodak on Right-Hand Page	3.69	2.36	33	6.39	7.16	31
AVERAGE	4.02	4.08	120	5.98	5.60	123
Difference			1.96			
S.E. (diff.)			.63			
C. R.			3.1			

TABLE XXV.

Probability Scores on Four One-Page Advertisements When Each Appeared with and without a Cartoon on the Opposite Page

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Effect of Cartons		Differences		
	% With Cartoon	% Without Cartoon	Differences	C.R.	Probability
Capital Stock on Left-Hand Page	36	31	5	.6	.274
Capital Stock on Right-Hand Page	26	38	12	1.5	.067
Eastman Kodak on Left-Hand Page	48	67	19	2.3	.011
Eastman Kodak on Right-Hand Page	48	69	21	2.6	.005

λ^2 22.48

The collective results are significant at the 1% level.

TABLE XXVI.

Mean Time in Seconds Spent on Two Two-Column and Two One-Column Advertisements When Each Appeared with and without a Cartoon on the Same Page

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Effect of Cartoons					
	With Cartoon			Without Cartoon		
	Mean	S.D.	N	Mean	S.D.	N
Remington-Rand on Left-Hand Page—Two Columns	1.78	2.50	34	2.29	2.07	23
Remington-Rand on Right-Hand Page—Two Columns	2.64	2.08	32	4.60	4.04	31
Del Monte on Left-Hand Page—One Column	1.58	2.17	33	2.00	1.70	31
Del Monte on Right-Hand Page—One Column	3.20	2.56	27	5.39	3.91	35
AVERAGE	2.24	2.41	126	3.72	3.52	120

Difference	1.48
S.E. (diff.)	.39
C.R.	3.8

TABLE XXVII.

Probability Scores on Two Two-Column and Two One-Column Advertisements When Each Appeared with and without a Cartoon on the Same Page

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evenng Post*	Effect of Cartoons		Differences		
	With Cartoon	Without Cartoon	Differences	C. R.	Probability
Remington-Rand on Left-Hand Page—Two Columns	16	26	10	1.2	.115
Remington-Rand on Right-Hand Page—Two Columns	33	44	11	1.3	.097
Del Monte on Left-Hand Page—One Column	39	39	0	0	.500
Del Monte on Right-Hand Page—One Column	49	65	16	1.9	.029

λ^2 17.46

The collective results are significant at the 5% level.

The results of the measurements of the mean time spent on all the advertisements with and without a nearby cartoon are given in Table XXVIII.[21] This table reveals that, for the ten arrangements studied, the average time spent was 2.94 seconds when the nearby cartoon was present; whereas, when the cartoon had been eliminated this average was raised to 4.54 seconds. The difference of 1.60 seconds was 4.4 times its standard error and, hence, was significant from a statistical viewpoint.

Table XXVIII also reveals that, of the ten situations studied, nine showed a definitely greater average time spent by the reader upon the advertisement when the adjacent cartoon had been eliminated than

[21] This table and the succeeding one include two arrangements of the two-column Pyroil advertisement which were not included in either of the previous tables. They were not included previously because the cartoon appeared on the opposite rather than on the same page. Their inclusion in the composite tables is justified in drawing general conclusions on the effect of a cartoon, regardless of the size of the advertisement and the location of the nearby cartoon.

when the cartoon was present as it appeared in the normal issue of the magazine. The only exception to this finding was the ninth item in the table, which showed a slight and statistically insignificant reversal.

The results of the measurements of the probability scores, when all the advertisements appearing with and without cartoons were considered, are given in Table XXIX. This table reveals that, for the composite results of the ten arrangements the difference in favor of the arrangement with the cartoon blanked out was significant at the 1% level.

In summarizing this part of the study, it seems safe to state that, if the reader traffic is held constant as it was in this study, the advertisements on a spread which does not contain a cartoon have preferred positions.

TABLE XXVIII.

Mean Time in Seconds Spent on Ten Advertisements When Each Appeared with and without a Cartoon on the Same Spread

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Effect of Cartoons					
	With Cartoon			Without Cartoon		
	Mean	S.D.	N	Mean	S.D.	N
Eastman Kodak on Left-Hand Page	2.64	3.79	27	5.99	5.13	35
Eastman Kodak on Right-Hand Page	3.69	2.36	33	6.39	7.16	31
Pyroil on Left-Hand Page	1.77	1.65	32	3.24	2.23	31
Pyroil on Right-Hand Page	2.81	2.93	34	2.94	2.06	23
Remington-Rand on Left-Hand Page	1.78	2.50	34	2.29	2.07	23
Remington-Rand on Right-Hand Page	2.64	2.08	32	4.60	4.04	31
Del Monte on Left-Hand Page	1.58	2.17	33	2.00	1.70	31
Del Monte on Right-Hand Page	3.20	2.56	27	5.39	3.91	35
Capital Stock on Left-Hand Page	4.91	5.62	34	4.63	3.50	26
Capital Stock on Right-Hand Page	3.69	3.47	26	6.70	5.58	31
AVERAGE	2.94	3.28	312	4.54	4.51	297

Difference	1.60
S.E. (diff.)	.36
C.R.	4.4

TABLE XXIX.

Probability Scores on Ten Advertisements When Each Appeared with and without a Cartoon on the Same Spread

Advertisements Appearing in the December 16, 1939, Issue of the *Saturday Evening Post*	Effect of Cartoons		Differences		
	With Cartoon	Without Cartoon	Difference	C. R.	Probability
Eastman Kodak on Left-Hand Page	48	67	19	2.3	.011
Eastman Kodak on Right-Hand Page	48	69	21	2.6	.005
Pyroil on Left-Hand Page	31	39	8	1.0	.159
Pyroil on Right-Hand Page	40	40	0	0	.500
Remington-Rand on Left-Hand Page	16	26	10	1.2	.115
Remington-Rand on Right-Hand Page	33	44	11	1.3	.097
Del Monte on Left-Hand Page	39	39	0	0	.500
Del Monte on Right-Hand Page	49	65	16	1.9	.029
Capital Stock on Left-Hand Page	36	31	5	.6	.274
Capital Stock on Right-Hand Page	26	38	12	1.5	.067

λ^2 45.00

The collective results are significant above the 1% level.

IX. CONCLUSIONS

Five major conclusions were reached in this study. They follow in the order of their ascertainment.

1. The reliability of the utilized techniques, which were based on mean time scores and probability scores, was amply high for the type of group measurements with which the study was concerned. The correlation between the mean time scores of students and non-students on the whole advertisement was .85. The correlation between these same populations was .89 when probability scores for the whole advertisement were used. (These same correlations indicate that college students and adults not attending college do not differ appreciably in the way they look at advertisements.)
2. Rankings of fifty-nine advertisements on the basis of mean time scores varied somewhat from the rankings of the same advertisements on the basis of probability scores. The correlation between the mean time and the probability scores were as follows: .48 for combined groups; .56 for males (students and non-students); and .40 for females (students and non-students).
3. In general, there were no appreciable differences found between the four magazine positions studied (front inside cover, page before first story, one of central pages, and back inside cover), regardless of whether the mean time or probability scores were used. When the mean time scores were used, the only difference found significant was between the inside front and the inside back cover. The difference of 2.21 seconds in favor of the inside back cover was 3.3 times its standard error. When probability scores were used, there were no differences found significant above the 30% level.
4. The following conclusions were found with respect to position on the spread. For one-page advertisements, no significant difference between left- and right-hand pages was found through the use of either mean time or probability scores. For two-column advertisements, the right outside columns were found significantly better by both mean time and probability scores. In the case of the mean time scores, the difference of .94 was 3.1 times its standard error; in the case of the probability scores,

the collective results were significant at the 1% level. For one-column advertisements, the right outside column was found significantly better by both mean time and probability scores. In the case of the mean time scores, the difference of 1.71 seconds was 4.8 times its standard error; in the case of the probability scores, the collective results were significant at the 1% level. For one-quarter page and one-half column advertisements, it was found that there was probably one bad corner on a two-page spread. This corner was the lower left. In the case of one-quarter page advertisements, the upper right corner was found significantly better than the lower left corner, having a difference of 4.2 times its standard error, when measured by the mean time scores. The upper left corner and the lower right corner were found somewhat better than the lower left corner, having differences of 2.1 and 2.3 times their standard errors, respectively. When measured by their probability scores, the upper left and upper right corners were significantly better (at the 5% level) than the lower left corner. In the case of one-half column advertisements, the upper right and lower right corners, each versus the lower left corner, approached significance with differences 2.4 and 2.6 times their standard errors, respectfully, when measured by their mean time scores. When measured by their probability scores, there were found no differences which could be considered significant.

5. It was found, in the case of both mean time scores and probability scores, that nearby cartoons have a definite distracting effect on advertisements. When measured by mean time scores, the difference between the average time spent on an advertisement with a nearby cartoon and on the same advertisement without the nearby cartoon was 1.60 seconds in favor of the latter. This difference was 4.4 times its standard error. When probability scores were used, the difference in favor of the arrangement without the cartoon was significant at the 1% level.